UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,557	03/29/2004	James A. Mott	SUN-P8934	1397

57960 7590 07/14/2008

PVF -- SUN MICROSYSTEMS INC.
C/O PARK, VAUGHAN & FLEMING LLP
2820 FIFTH STREET
DAVIS, CA 95618-7759

EXAMINER	
RUBIN, BLAKE J	

ART UNIT	PAPER NUMBER
2157	

MAIL DATE	DELIVERY MODE
07/14/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/811,557	MOTT ET AL.	
	Examiner	Art Unit	
	BLAKE RUBIN	2157	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 April 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to communications filed April 9, 2008.

2. Claims 1- 39 are pending in this application. Claims 1, 8, 12, 13, and 35 are currently amended.

Claim Objections

3. Claims 1, 8, 12, and 13 are objected to because of the following informalities: the amended portions of the claims recite, "the next entry of in the linked list," which is awkward. Examiner suggests further amending the claim to recite, "the next entry in the linked list." Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 22-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Pettey et al. (Patent No. 6,594,712), hereinafter Pettey.

6. With respect to claim 22, Pettey discloses an apparatus for queuing multiple types of receive traffic in a communication interface (column 6, lines 15-38), comprising: a queue for queuing multiple types of receive traffic associated with communications to be transmitted from the communication interface (column 7, lines 65-67; column 8, lines 1-7); a head pointer configured to identify a head of said queue (column 23, lines 28-33); a tail pointer configured to identify a tail of said queue, wherein said traffic commands are enqueued at said tail (column 23, lines 28-33); a next entry pointer configured to identify a next entry in said queue to be processed (column 23, lines 33-37); and a linked list, wherein each entry in said linked list corresponds to an RDMA Read request issued by the communication interface (column 11, lines 18-37), and is configured to identify a range of sequence numbers associated with expected responses to the RDMA Read request (column 23, lines 28-37).

7. With respect to claim 23, Pettey discloses the apparatus of claim 22, wherein each entry said linked list is further configured to identify a sequence number of a most recently received response to the RDMA Read request (column 23, lines 21-37).

8. With respect to claim 24, Pettey discloses the apparatus of claim 22, wherein the linked list is one of multiple linked lists (column 11, lines 59-67), each said linked list corresponding to a separate InfiniBand queue pair (column 10, lines 57-61).

9. With respect to claim 25, Pettey discloses the apparatus of claim 22, further comprising: a retry queue, wherein a retry entry is added to said retry queue for each RDMA Read request issued by the communication interface (column 22, lines 23-32); wherein a first retry entry in said retry queue corresponding to a first RDMA Read request is retired when said expected responses to the first RDMA Read request are received (column 24, lines 10-19).

10. With respect to claim 26, Pettey discloses the apparatus of claim 22, further comprising: a memory configured to store pointers to a first entry and a last entry in said linked list (column 23, lines 28-37).

11. With respect to claim 27, Pettey discloses the apparatus of claim 22, wherein said queue comprises an assembly area for assembling a communication associated with a first type of receive traffic (column 8, lines 20-24; column 23, lines 2-14).

12. With respect to claim 28, Pettey discloses the apparatus of claim 27, wherein said assembly area comprises a portion of said queue (column 14, lines 10-25) delimited by said head pointer and said next entry pointer (column 23, lines 28-33).

13. With respect to claim 29, Pettey discloses the apparatus of claim 27, wherein said first type of receive traffic is an InfiniBand RDMA Read command comprising a set

of RDMA read descriptors configured to identify the communication associated with said first type of receive traffic (column 14, lines 40-48).

14. With respect to claim 30, Pettey discloses the apparatus of claim 29, wherein a second type of receive traffic is an InfiniBand Send command configured to encapsulate the communication associated with said second type of receive traffic command (column 12, lines 58-65).

15. With respect to claim 31, Pettey discloses the apparatus of claim 27, wherein: said first type of receive traffic comprises a set of descriptors, wherein each said descriptor is configured to describe a portion of the communication associated with said first type of receive traffic (column 13, lines 45-57); and the apparatus is configured to issue read requests to retrieve the portions of the communication described by the set of descriptors and assemble said portions in said assembly area column 13, lines 58-67; column 14, lines 1-9).

16. With respect to claim 32, Pettey discloses the apparatus of claim 22, further comprising: a transmit module configured to transmit the communications associated with said receive traffic (column 14, lines 21-30); wherein each communication associated with receive traffic is forwarded from said queue to said transmit module after the communication is determined to be complete (column 14, lines 36-38).

17. With respect to claim 33, Pettey discloses the apparatus of claim 32, wherein a communication is forwarded from said queue to said transmit module (column 14, lines 12-15; column 14, lines 21-24; whereby the bus router forwards queue's to transmit) by passing to the transmit module a set of pointers delimiting the communication within said queue (column 14, lines 24-32; Figure 9; whereby the SGL's maintain sets of pointers from within queue).

18. With respect to claim 34, Pettey discloses the apparatus of claim 22, wherein said queue comprises a linked list of buffers within a memory structure (column 14, lines 15-20) configured to queue receive traffic for multiple communication connections (column 14, lines 20-24; Figure 3; whereby the figure shows multiple connections).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

21. Claims 1, 3, 10, and 12-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagan et al. (Patent No. 7,013,419, hereinafter Kagan) in view of Gasbarro et al (U.S. Patent Application Publication No. 2002/0141424, hereinafter Gasbarro).

22. With respect to claim 1, Kagan discloses a method of processing traffic received from an InfiniBand node (column 7, lines 13-14) via a first queue pair (column 7, lines 55-56), comprising:

selecting a traffic entry in an InfiniBand receive queue (column 10, lines 1-5), wherein said traffic entry comprises one of:

a Send command comprising an encapsulated communication (column 9, lines 29-32; where "packet payload" constitutes an encapsulated communication);

a Send command comprising an RDMA Read descriptor (column 3, lines 4-11; whereby Kagan uses "send" throughout to be synonymous with Read as described in the disclosure); and

an RDMA Read response comprising a response to an RDMA Read request (column 8, lines 17-25);

if said selected traffic entry comprises a Send command comprising an RDMA Read descriptor:

issuing a first RDMA Read request to retrieve one or more portions of a communication described by said RDMA Read descriptor (column 8, lines 17-24);

in a linked list corresponding to the first queue pair, adding an entry corresponding to said first RDMA Read request (column 8, lines 17-24), in a retry queue (column 10, lines 32-53), adding an entry corresponding to said first RDMA Read request (column 10, lines 32-36); and

if said selected traffic entry comprises an RDMA Read response to said first RDMA Read request:

identifying a sequence number associated with said RDMA Read response (column 10, lines 36-41);

comparing said sequence number to said range of sequence numbers (column 10, lines 41-44);

storing said one or more portions of said described communication to facilitate assembly of said described communication in said queue (column 10, lines 28-31); and

if said sequence number matches a final sequence number in said range, retiring in said retry queue said entry corresponding to said first RDMA Read request (column 10, lines 41-44).

But Kagan does not discloses first and last sequence numbers.

However, Gasbarro discloses a first sequence number and a last sequence number that identify a range of sequence numbers associated with expected responses

to said first RDMA Read requests (paragraph [0089], Figure 11) and optionally comprising a sequence number of the most recently received response or a link to the next entry of in the linked list (paragraph [0036]).

It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of Gasbarro. The motivation to do so being to improve the efficiency of the method by keeping track of data corresponding to detect missing or duplicate packets (Gasbarro, paragraph [0036]).

23. With respect to claim 3, the combination of Kagan and Gasbarro discloses the method of claim 1, Kagan discloses if said selected traffic entry comprises an RDMA Read response to said first RDMA Read request: if said sequence number does not match said final sequence number, updating said entry in said linked list to include said sequence number (column 10, lines 44-47).

24. With respect to claim 10, the combination of Kagan and Gasbarro discloses the method of claim 1, Kagan discloses if said selected traffic entry comprises an RDMA Read descriptor: appending space to a head of said queue (column 8, lines 39-41); wherein said described communication is assembled in said appended space (column 9, lines 19-32).

25. With respect to claim 12, Kagan discloses a computer readable medium storing instructions that, when executed by a computer, cause the computer to perform a method of processing traffic received from an InfiniBand node (column 7, lines 13-14) via a first queue pair (column 7, lines 55-56), the method comprising:

selecting a traffic entry in an InfiniBand receive queue (column 10, lines 1-5), wherein said traffic entry comprises one of:

a Send command comprising an encapsulated communication (column 9, lines 29-32; whereby "packet payload" constitutes an encapsulated communication);

a Send command comprising an RDMA Read descriptor (column 3, lines 4-11; whereby Kagan uses "send" throughout to be synonymous with Read as described in the disclosure); and

an RDMA Read response comprising a response to an RDMA Read request (column 8, lines 17-25);

if said selected traffic entry comprises a Send command comprising an RDMA Read descriptor:

issuing a first RDMA Read request to retrieve one or more portions of a communication described by said RDMA Read descriptor (column 8, lines 17-24);

in a linked list corresponding to the first queue pair, adding an entry corresponding to said first RDMA Read request (column 8, lines 17-24); and

in a retry queue (column 10, lines 32-53), adding an entry corresponding to said first RDMA Read request (column 10, lines 32-36); and

if said selected traffic entry comprises an RDMA Read response to said first RDMA Read request:

identifying a sequence number associated with said RDMA Read response (column 10, lines 36-41);

comparing said sequence number to said range of sequence numbers (column 10, lines 41-44);

storing said one or more portions of said described communication to facilitate assembly of said described communication in said queue (column 10, lines 28-31); and

if said sequence number matches a final sequence number in said range, retiring in said retry queue said entry corresponding to said first RDMA Read request (column 10, lines 41-44).

But Kagan does not disclose first and last sequence numbers.

However, Gasbarro discloses a first sequence number and a last sequence number that identify a range of sequence numbers associated with expected responses to said first RDMA Read requests and optionally comprising a sequence number of the most recently received response or a link to the next entry of in the linked list (paragraph [0089], Figure 11).

It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of Gasbarro. The motivation to do so being to improve the efficiency of the method by keeping track of data corresponding to detect missing or duplicate packets (Gasbarro, paragraph [0036])

26. With respect to claim 13, Kagan discloses a method of tracking responses to an RDMA Read operation (column 3, lines 4-11; whereby Kagan uses "send" throughout to be synonymous with Read as described in the disclosure), the method comprising:

issuing an RDMA Read on a first communication connection (column 8, lines 17-22);

identifying a range of sequence numbers to be associated with responses to the RDMA Read (column 10, lines 36-52);

adding an entry to a first linked list corresponding to the first communication connection (column 10, lines 36-56), said entry comprising:

receiving a first RDMA Read response (column 8, lines 20-28);

determining whether a first sequence number associated with the first RDMA Read response matches a last sequence number in said range of sequence numbers (column 10, lines 36-56); and

if said first sequence number does not match said last sequence number, updating said latest sequence number to match said first sequence number (column 10, lines 36-56).

But Kagan does not disclose first and last sequence numbers.

However, Gasbarro discloses a first and last sequence number that identify said range of sequence numbers; a latest sequence number received in said range of sequence numbers (paragraph [0089], Figure 11); optionally a link to the next entry of in the linked list (paragraph [0036]).

It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of Gasbarro. The motivation to do so being to improve the efficiency of the method by keeping track of data corresponding to detect missing or duplicate packets (Gasbarro, paragraph [0036])

27. With respect to claim 14, the combination of Kagan and Gasbarro discloses the method of claim 13, Kagan discloses if said first sequence number matches said last sequence number, retiring an entry in a retry queue corresponding to the RDMA Read (column 10, lines 36-56).

28. With respect to claim 15, the combination of Kagan and Gasbarro discloses the method of claim 13, Kagan discloses the first communication connection is an InfiniBand queue pair (column 7, lines 13-16).

29. With respect to claim 16, the combination of Kagan and Gasbarro discloses the method of claim 15, Kagan discloses wherein: said issuing is performed by an InfiniBand transmit module (column 7, lines 16-25; HCA); and said adding, said determining and said updating are performed by an InfiniBand receive module (column

10, lines 1-10); the method further comprising: at the InfiniBand transmit module, retrying the RDMA Read if an RDMA Read response associated with said range of sequence numbers is received out of order (column 10, lines 36-56).

30. With respect to claim 17, the combination of Kagan and Gasbarro discloses the method of claim 15, Kagan discloses wherein: said issuing is performed by an InfiniBand transmit module (column 7, lines 16-25; HCA); and said adding, said determining and said updating are performed by an InfiniBand receive module (column 10, lines 1-10); the method further comprising, at the InfiniBand transmit module: maintaining a retry queue for tracking RDMA Reads that have not yet completed (column 10, lines 36-56); and retiring an entry in said retry queue corresponding to the RDMA Read if RDMA Read responses corresponding to said range of sequence numbers are received in order (column 10, lines 36-56).

31. With respect to claim 18, the combination of Kagan and Gasbarro discloses the method of claim 17, Kagan discloses at the InfiniBand transmit module: retrying the RDMA Read if RDMA Read responses corresponding to one or more of said range of sequence numbers are received out of order (column 10, lines 36-56).

32. With respect to claim 19, the combination of Kagan and Gasbarro discloses the method of claim 13, Kagan discloses said identifying comprises: dividing an amount of

data to be received in response to the RDMA Read by a maximum transfer unit (column 3, lines 15-17) in effect for the first communication connection (column 8, lines 25-28).

33. Claims 2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagan and Gasbarro as applied to claim 1 above, and further in view of the InfiniBand Architecture Specification 1.0 (hereinafter InfiniBand Spec).

34. With respect to claim 2, the combination of Kagan and Gasbarro discloses the method of claim 1, but fails to disclose an external communication link. However, the InfiniBand Spec discloses forwarding a communication associated with said selected traffic entry, for transmission on an external communication link (page 33, Figure 1; page 71, paragraph 3), wherein said communication is one of: said encapsulated communication; and said described communication, after said described communication is assembled (page 71, paragraph 3). It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of the InfiniBand Spec. The motivation to do so is demonstrated by Kagan's incorporation of the specification by reference (column 2, lines 15-21).

35. With respect to claim 11, the combination of Kagan and Gasbarro discloses the method of claim 1, further comprising, if said selected traffic entry comprises an RDMA Read response to said first RDMA Read request: requesting a retry of said first RDMA Read request (column 10, lines 47-52). But fails to disclose dropping responses

received out of order. However, the InfiniBand Spec discloses dropping an RDMA Read response received out of order (page 319, section 9.8.2; Table 49). It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of the InfiniBand Spec. The motivation to do so is demonstrated by Kagan's incorporation of the specification by reference (column 2, lines 15-21).

36. Claims 4-6 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagan and Gasbarro as applied to claims 1 and 13 above, and further in view of the Kagan (U.S. Patent Application Publication 2002/0165899), hereinafter Kagan-B.

37. With respect to claim 4, the combination of Kagan and Gasbarro discloses the method of claim 1, but fails to disclose a single memory structure. However, Kagan-B discloses maintaining a single memory structure comprising multiple linked list (paragraph [0039], lines 1-4), including said linked list; wherein each linked list stores entries associated with RDMA Read requests for a different InfiniBand queue pair (paragraph [0039], lines 4-9). It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of the Kagan-B. The motivation to do so is demonstrated by Kagan's incorporation of Kagan-B by reference (column 7, lines 57-62).

38. With respect to claim 5, the combination of Kagan and Gasbarro discloses the method of claim 1, but fails to disclose maintaining a single memory structure. However, Kagan-B discloses maintaining a single memory structure (paragraph [0039], lines 1-4) for queuing InfiniBand traffic received via multiple virtual lanes and multiple queue pairs (paragraph [0039], lines 4-9), said single memory structure comprising said queue (paragraph [0039], lines 4-9). It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of the Kagan-B. The motivation to do so is demonstrated by Kagan's incorporation of Kagan-B by reference (column 7, lines 57-62).

39. With respect to claim 6, Kagan, Gasbarro and Kagan-B discloses the method of claim 5, wherein said queue comprises a linked list of memory buffers within said single memory structure (Kagan-B: paragraph [0039], lines 1-9).

40. With respect to claim 20, the combination of Kagan and Gasbarro discloses the method of claim 13, but fails to disclose a single memory structure. However, Kagan-B discloses maintaining a single memory structure (paragraph [0039], lines 1-4) comprising multiple linked lists corresponding to multiple communication connections, including said first linked list corresponding to the first communication connection (paragraph [0039], lines 4-9). It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of the Kagan-B. The motivation to do so is demonstrated by Kagan's incorporation of

Kagan-B by reference (column 7, lines 57-62).

41. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kagan and Gasbarro as applied to claim 1 above, and further in view of Pettey.

42. With respect to claim 7, the combination of Kagan and Gasbarro discloses the method of claim 1, but fails to disclose head and tail pointers. However, Pettey discloses maintaining a head pointer configured to identify a head of said linked list (column 23, lines 28-33); and maintaining a tail pointer configured to identify a tail of said linked list (column 23, lines 28-33). It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of Pettey. The mechanism to identify packet sequence numbers is disclosed by Kagan (column 9, lines 60-67), therefor it would have been obvious to combine the pointers to include the head and tail pointers, to allow for the communication to be described by its first and last packets.

43. With respect to claim 8, the combination of Kagan and Gasbarro discloses the method of claim 1, but fails to disclose head and tail pointers. However, Pettey discloses maintaining a head pointer configured to identify a head of said queue (column 23, lines 28-33); maintaining a tail pointer configured to identify a tail of said queue (column 23, lines 28-33); and maintaining a next traffic entry pointer configured to identify a next entry in said queue to be processed (column 23, lines 33-37). It would

have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of Pettey. The mechanism to identify packet sequence numbers is disclosed by Kagan (column 9, lines 60-67), therefor it would have been obvious to combine the pointers to include the head and tail pointers, to allow for the communication to be described by its first and last packets.

44. With respect to claim 9, Kagan, Gasbarro and Pettey disclose the method of claim 8, wherein said tail pointer is configured to identify where in said queue a next traffic entry is to be queued (column 23, lines 32-37).

45. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kagan, Gasbarro and Kagan-B as applied to claim 20 above, and further in view of Pettey.

46. With respect to claim 21, Kagan, Gasbarro and Kagan-B discloses the method of claim 20, but fails to disclose pointers to the first and last entry. However, Pettey discloses each of the multiple communication connections, including the first communication connection, maintaining pointers to the first entry and the last entry in the corresponding linked list (column 23, lines 33-37). It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan and Kagan-B with the teachings of Pettey. The mechanism to identify packet sequence numbers is disclosed by Kagan (column 9, lines 60-67), therefor it would

have been obvious to combine the pointers to include the head and tail pointers, to allow for the communication to be described by its first and last packets.

47. Claims 35-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pettey in view of Gasbarro.

48. With respect to claim 35, Pettey discloses a communication interface for tracking responses to an InfiniBand RDMA Read request (column 13, lines 45-52), comprising:

for each of one or more active InfiniBand queue pairs (column 10, lines 57-62), a corresponding linked list (column 9, lines 33-44; whereby the address range registers list the address ranges in the memory), wherein each entry in said linked list is configured to include:

a previous sequence number, wherein said previous sequence number is a sequence number associated with a most recently received response to the RDMA Read request (column 14, lines 1-7).

But Pettey does not disclose first and last sequence numbers.

However, Gasbarro discloses a first and a last sequence numbers that identify a range of sequence numbers associated with expected responses to an RDMA Read request issued on the corresponding queue pair by the communication interface (paragraph [0089], Figure 11); optionally a link to the next entry of in said linked list; for each of the linked lists, pointers to a first entry and a last entry in said linked list (paragraph [0036]).

It would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Kagan with the teachings of Gasbarro. The motivation to do so being to improve the efficiency of the method by keeping track of data corresponding to detect missing or duplicate packets (Gasbarro, paragraph [0036])

49. With respect to claim 36, the combination of Pettey and Gasbarro discloses the communication interface of claim 35, Pettey discloses a retry queue configured to queue retry entries corresponding to RDMA Read requests issued by the communication interface (column 22, lines 23-27); wherein an retry entry in said retry queue is retired when a final response to a corresponding RDMA Read request is received (column 24, lines 10-13), said final response being identified by a final sequence number in said range of sequence numbers (column 23, lines 28-37).

50. With respect to claim 37, the combination of Pettey and Gasbarro discloses the communication interface of claim 35, Pettey discloses a transmit module (column 14, lines 10-25) configured to: issue a first RDMA Read request on a first queue pair (column 14, column 13-17); and calculate said range of sequence numbers associated with said expected responses to the first RDMA Read request (column 18, lines 13-27); and a receive module (column 14, lines 40-43) configured to add an entry, corresponding to the first RDMA Read request, to said corresponding first linked list (column 14, lines 45-54).

51. With respect to claim 38, the combination of Pettey and Gasbarro discloses the communication interface of claim 37, Pettey discloses wherein said receive module is further configured to: determine a sequence number of a response to the first RDMA Read request (column 14, lines 1-9); and determine if said sequence number matches a final sequence number in said range of sequence numbers associated with expected responses to the first RDMA Read request (column 14, lines 65-67; column 15, lines 1-4).

52. With respect to claim 39, the combination of Pettey and Gasbarro discloses the communication interface of claim 38, Pettey discloses wherein said receive module is further configured to: determine if said sequence number is out of order (column 14, lines 57-60).

Response to Arguments

53. Applicant's arguments with respect to claims 1, 12, 13, and 35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

54. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

55. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BLAKE RUBIN whose telephone number is (571) 270-3802. The examiner can normally be reached on M-R: 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ario Etienne can be reached on (571) 272-4001. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BJR

/Ario Etienne/
Supervisory Patent Examiner, Art Unit 2157